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(54) VIDEO SIGNAL RECORDING AND REPRODUCING DEVICE

(57)Abstract:

PURPOSE: To enhance the recording efficiency and to preserve the information of all patterns when a MUSE signal is converted into an NTSC signal and the NTSC signal is recorded/reproduced.

CONSTITUTION: A MUSE/NTSC signal conversion circuit 22 converts a MUSE signal into an NTSC signal while applying modification of a picture attended with the conversion of its aspect ratio, and a recording and reproducing circuit 28 records the NTSC signal in a conventional way. A vertical filter 30 at the time of reproduction is used to select whether an aspect ratio for a high definition television signal employing the MUSE signal or a side-cut pattern resulting from cutting both sides of a pattern and applying horizontal time expansion thereto is adopted.

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CLAIMS

[Claim(s)]

[Claim 1] The video signal of the 1st television system to the video signal of the 2nd television system with which an aspect ratio differs from said 1st television system They are video-signal record and a regenerative apparatus including the method conversion means for changing saving all information substantially. In the case of the method conversion by said method conversion means, deformation may be added to a subject-copy image with conversion of an aspect ratio. Record / playback means for said video-signal record and regenerative apparatus recording further the video signal by which method conversion was carried out with said method conversion means on a record medium, and reproducing from a record medium, Video-signal record and a regenerative apparatus including the image restoration means for performing signal processing to said reproduced video signal from the video signal reproduced by said record / playback means, so that said deformation of some subject-copy images [at least] may be removed.

[Claim 2] The detection means for detecting whether said method conversion means receives the video signal of said 1st television system, and is changing and outputting to the video signal of said 2nd television system, The 1st selection means for answering the detection output of said detection means and giving the video signal of said 2nd usual television system other than the output of said method conversion means, and the output of said method conversion means alternatively to said record / playback means, The distinction signal superposition means for superimposing a distinction signal on the video signal of said 2nd television system which answers the detection output of said detection means and is given to said record / playback means, Said distinction signal is taken out from the video signal reproduced by said record / playback means. The regenerative-signal distinction means for distinguishing whether it is the video signal by which method conversion of the reproduced video

signal was carried out with said method conversion means, The video-signal record and the regenerative apparatus according to claim 1 which answers the output of said regenerative-signal distinction means, and includes the 2nd selection means for outputting alternatively one side of the playback video signal of said record / playback means, and the output of said image restoration means.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the video-signal record and the regenerative apparatus which performs method conversion which needs aspect ratio conversion especially about the video-signal record and the regenerative apparatus having a television-standards-conversion machine.

[0002]

[Description of the Prior Art] Recently, a high definition television system is going into the phase of utilization. A high definition television system is incompatible with the present television systems (NTSC system, PAL system, etc.) in principle. However, about the present television system, about 100% of diffusion rate is obtained to most of a receiving set, the record, the regenerative apparatus, etc. only for high definition television systems having not spread. Then, the video-signal record and the regeneration system which built in the television-standards-conversion machine which changes the signal of a high definition television system into the signal of the present television system can be considered. As the example, the conventional system is explained by making into an example the converter of the high definition television signal by the MUSE which NHK (Japan Broadcasting Corporation) developed, and the television signal of the present NTSC system. In addition, generally, a high definition television has a bigger aspect ratio than the aspect ratio of the present television system so that it may be called a wide aspect ratio. For example, the aspect ratio of the image which a MUSE signal treats to an aspect ratio being 4:3 in NTSC system is 16:9.

[0003] With reference to drawing 14 , the conventional video-signal record and regeneration system record the NTSC signal which the television-standards-conversion machine 182 for changing the MUSE signal 188 into the image of an NTSC signal and the television-standards-conversion machine 182 output on a magnetic tape 200 using the rotary head equipped by the rotary drum 198, and contains the record and the regenerative apparatus 184 for the NTSC system for reproducing. Playback NTSC signal 194 which record and a regenerative apparatus 184 output can

be displayed with a television receiver 186 as it is.
[0004] The television-standards-conversion machine 182 by performing signal processing, such as de-emphasis processing, and time-axis transform processing from a MUSE signal to an NTSC signal, infanticide processing of the scanning line, to the MUSE signal inputted MUSE / NTSC signal processing circuit 190 for changing into an NTSC signal, Predetermined processing is performed to the NTSC signal which MUSE / NTSC signal processing circuit 190 outputs, deformation of the image of the NTSC signal which a circuit 190 outputs is removed, and the perpendicular filter 192 for acquiring the video signal which can be displayed on the screen of NTSC system in a normal form is included. In case deformation of an image is removed, the aspect ratio selecting switch 196 for choosing whether the aspect ratio of an image is doubled with it of the image of the original MUSE signal or it doubles with it of the image of an NTSC signal is formed in the perpendicular filter 192.
[0005] The equipment shown in drawing 14 operates as follows. The MUSE signal 188 inputted into MUSE / NTSC signal processing circuit 190 with reference to drawing 15 is Screen A of an aspect ratio 16:9. By carrying out de-emphasis processing, infanticide of time-axis transform processing and the scanning line, etc. to a MUSE signal as mentioned above, MUSE / NTSC signal processing circuit 190 compresses a screen into a longitudinal direction to be shown in drawing 15 , and outputs the video signal used as the aspect ratio of 4:3. Thus, the screen which is compressed by the longitudinal direction and has the aspect ratio of 4:3 is henceforth called a compression full screen display. The picture signal of this compression full screen display B is changed into an NTSC signal, and if it is made to give and display on television as it is, as shown in drawing 15 , what was a perfect circle will deform it into a longwise ellipse, and it will be expressed as original Screen A. Therefore, it is necessary to remove this deformation.
[0006] The perpendicular filter 192 is for removing this deformation. There are two kinds in the approach of removal. The 1st approach is an approach of removing deformation, by cutting both the sides of the compression full screen display B, and extending the central part of an image in a longitudinal direction like Screen C shown in drawing 15 . The 2nd approach is an approach of removing deformation, without cutting both sides by compressing a screen perpendicularly, as shown by Screen D of drawing 15 . In this case, infanticide processing of the scanning line etc. is performed.
[0007] The signal processed like Screen C and Screen D is recorded on a magnetic tape 200 with record and the regenerative apparatus 184 of drawing 14 .
[0008] Playback is the same as playback of the usual NTSC signal. That is, the NTSC signal recorded on the magnetic tape 200 is reproduced with record and a regenerative apparatus 184. By giving reproduced NTSC signal 194 to a television receiver 186, Screen C shown in drawing 15 or Screen D will be displayed.
[0009]
[Problem(s) to be Solved by the Invention] When recording the side cut display C on a

magnetic tape among the conventional systems, in order that the data of both the sides of a screen may be missing, it becomes impossible to reproduce all the images at the time of playback. In the program of a high definition television, since a certain information is naturally displayed also on right and left of a screen usually in consideration of the aspect ratio, it is not desirable for it to be impossible to make the information on both sides missing in this way, and to reproduce it moreover.
[0010] On the other hand, such a trouble is not produced in the system using a full screen display D. However, a part without the image of the upper and lower sides of a screen will be contained in the signal recorded. When it argues from a viewpoint of the effectiveness at the time of recording a video signal, some record media will be vainly used for recording including the part which does not have an image in this way. It is more desirable if such futility can be eliminated.
[0011] So, the purpose of invention according to claim 1 is offering the video-signal magnetic recording and the regenerative apparatus which can be substantially reproduced in a right form, including the information on a subject-copy image for all in the equipment which changes the video signal of the 1st television system into the video signal of the 2nd television system with which aspect ratios differ, and is recorded and reproduced. [it is possible to record a video signal at high effectiveness, and]
[0012] The purpose of invention according to claim 2 is offering the video-signal magnetic recording and the regenerative apparatus which can perform automatically both being able to record the video signal of the 1st television system, and the video signal of the 2nd television system with which aspect ratios' differ at high effectiveness, and reproducing in a right form, including the information on a subject-copy image for all substantially.
[0013]
[Means for Solving the Problem] Video-signal magnetic recording and a regenerative apparatus according to claim 1 The method conversion means for changing into the video signal of the 2nd television system with which an aspect ratio differs the video signal of the 1st television system from the 1st television system, saving all information substantially, The magnetic recording and the playback means for recording the video signal by which method conversion was carried out with the method conversion means on a magnetic-recording medium, and reproducing from a magnetic-recording medium, The image restoration means for performing signal processing to the reproduced video signal from the video signal reproduced by magnetic recording and the playback means, so that deformation of some subject-copy images [at least] may be removed is included.
[0014] Video-signal magnetic recording and a regenerative apparatus according to claim 2 The detection means for being video-signal magnetic recording and a regenerative apparatus according to claim 1, and detecting further whether the method conversion means is changing and outputting the video signal of the 1st

television system to the video signal of the 2nd television system, The 1st selection means for answering the detection output of a detection means and giving the output of a method conversion means, and the video signal of the 2nd television system alternatively to record / playback means, The distinction signal superposition means for superimposing on the video signal of the 2nd television system to which the detection output of a detection means is answered and a distinction signal is given by record / playback means, The regenerative-signal distinction means for taking out and distinguishing a distinction signal from the video signal reproduced by record / playback means and the 2nd selection means for answering the output of a regenerative-signal distinction means and outputting alternatively one side of the playback video signal of record / playback means and the output of an image restoration means are included.

[0015]

[Function] In video-signal magnetic recording and a regenerative apparatus according to claim 1, after the video signal of the 1st television system is changed into the video signal of the 2nd television system, saving all information substantially, it is recorded on a magnetic-recording medium. Although deformation may be added to a subject-copy image with conversion of an aspect ratio in the case of this method conversion, since deformation of some subject-copy images [at least] is removed at the time of playback, an image is reproduced in a normal form by the image restoration means.

[0016] In video-signal magnetic recording and a regenerative apparatus according to claim 2 It is detected whether the method conversion means is changing and outputting the video signal of the 1st television system to the video signal of the 2nd television system. The video signal of the 2nd television system with which the video signal which a method conversion means outputs when conversion is performed does not receive the method conversion by the method conversion means when conversion is not performed is alternatively recorded on a magnetic-recording medium. At this time, it is superimposed on a distinction signal to answer the detection output of a detection means and for the video signal recorded distinguish whether the method conversion by the method conversion means is received. At the time of playback, this distinction signal is taken out from a playback video signal, in the case of the video signal which received method conversion, the video signal with which removal of deformation was performed is outputted by the image restoration means, and, in the case of the video signal which does not receive the method conversion by the method conversion means, it is outputted as it is.

[0017]

[Example] Drawing 1 is the circuit block diagram of one example of the video-signal magnetic recording and the regenerative apparatus concerning this invention. Although a MUSE signal is changed into the video signal of the present NTSC system and record and the equipment to reproduce are explained in the following examples,

this invention is not limited to this but can be similarly applied to it about conversion between other television systems.
[0018] With reference to drawing 1 , this magnetic recording and regenerative apparatus 10 have the external input terminal 12 of a MUSE signal, the satellite broadcasting service antenna input terminal 14, the terrestrial antenna input terminal 16, and the external input terminal 18 of an NTSC signal. Among these terminals, from a terminal 14, a MUSE signal and an NTSC signal are inputted and an NTSC signal is inputted from a terminal 16.
[0019] The BS (satellite broadcasting service) tuner 20 for magnetic recording and a regenerative apparatus 10 to output separately the MUSE signal which the input was connected to the terminal 14 and was further chosen according to actuation of a user, or the signal of an NTSC signal, The TV tuner 24 for outputting one NTSC signal which the input chose corresponding to actuation of a user among the broadcasting electric-waves which are connected to a terminal 16 and inputted from a terrestrial antenna, The input selecting switch 32 of 4 inputs in which the 1st input terminal is connected to a terminal 12, the 2nd input terminal is connected to the MUSE signal output terminal of a broadcasting satellite tuner 20, and other two input terminals do not have an input, respectively, While changing and outputting the MUSE signal which an input is connected and is inputted into the output of a switch 32 to an NTSC signal MUSE / NTSC signal processing circuit 22 for outputting the distinction signal which shows it when the inputted signal is a MUSE signal, One side of an input is connected to MUSE / NTSC signal processing circuit 22, and another side is connected to the output of the NTSC signal of a broadcasting satellite tuner 20, respectively. The selector 34 for choosing and outputting one side of the two inputs according to the value of the distinction signal which MUSE / NTSC signal processing circuit 22 outputs, The input selecting switch 36 of 4 inputs with which it connects with the distinction signal output of MUSE / NTSC signal processing circuit 22, and the 1st and 2nd input terminals do not have an input in other two input terminals, The 1st and 2nd input terminals contain in the output of a selector 34 the input selecting switch 38 by which the 3rd input terminal was connected to the output of the TV tuner 24, and the 4th input terminal was connected to the terminal 18, respectively. The input selecting switches 32, 36, and 38 answer actuation of a user, interlock, respectively and switch.
[0020] The record and the regenerative circuit 28 for the NTSC system for recording magnetic recording and a regenerative apparatus 10 on a magnetic tape using the head which an input is further connected [head] to the output of the input selecting switch 38, and does not have the video signal inputted illustrated, and reproducing, An input is connected to the output of the input selecting switch 36. At the time of record of a video signal According to the distinction signal given, a distinction signal is superimposed on the video signal recorded. At the time of playback The distinction signal encoder decoder 26 for decoding the regenerative signal given from record and

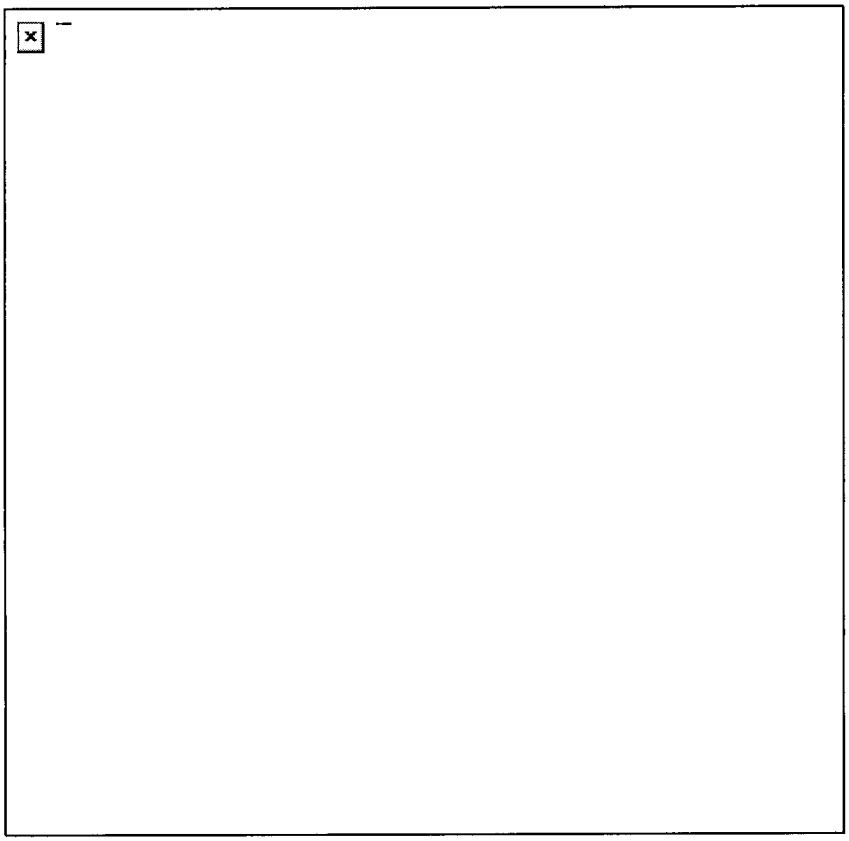
a regenerative circuit 28, and taking out a distinction signal, Record / playback switch 42 on which one side of an input was connected to the output of record and a regenerative circuit 28, and another side was connected to the output of the input selecting switch 38, respectively, Record / playback switch 40 on which one side of an input was connected to the output of the distinction signal encoder decoder 26, and another side was connected to the output of the input selecting switch 36, respectively is included. Record / playback switches 40 and 42 answer actuation of a user, and interlock and switch to it. For example, at the time of record, a switch 40 chooses the output of a switch 36, a switch 42 chooses the output of a switch 38, respectively, and it outputs to it. At the time of playback, a switch 40 chooses the output of the distinction signal encoder decoder 26, a switch 42 chooses the output of record and a regenerative circuit 28, respectively, and it outputs to it.

[0021] The selector 44 which answers the distinction signal which record / playback switch 40 outputs, and operates is connected to the output of record / playback switch 42. The perpendicular filter 30 is connected to one side of the output of a selector 44. The perpendicular filter 30 processes infanticide of the scanning line, interpolation, etc. to the video signal in which method conversion was carried out by MUSE / NTSC digital disposal circuit 22 and which was recorded, or the video signal directly given after method conversion is carried out, and it is the aspect ratio of an NTSC signal and it is for outputting the video signal showing the image from which the deformation given to the subject-copy image on the occasion of method conversion was removed. The perpendicular filter 30 changes the video signal by which method conversion was carried out into the format of the side cut screen C shown in drawing 15 , and a full screen display D. By the aspect ratio selecting switch 46, that either is chosen and these two video signals outputted from the perpendicular filter 30 are given to one input of a selector 48. The input of another side of a selector 48 is connected to the output terminal of the direction which is not connected with the perpendicular filter 30 of a selector 44. Both a selector 44 and the selector 48 answer the distinction signal outputted from a switch 40, and operate. The output of a selector 48 is given and displayed on a television receiver 50.

[0022] It is shown in the next table 1 how each switches 32, 36, 38, 40, 42, and 46 and each selectors 34, 44, and 48 are switched according to each mode of operation.

[0023]

[Table 1]



Drawing 2 is referred to. MUSE / NTSC signal processing circuit 22 The terminal 80 which receives the MUSE signal given from a switch 32, and the A/D (analogue to digital) converter 52 for changing the inputted MUSE signal of an analog into a digital signal, While performing signal processing of a Hi-Vision system to the digitized MUSE signal The Hi-Vision system digital disposal circuit 54 for outputting a distinction signal, and the time-axis transform processing 56 for performing time-axis conversion in an NTSC system to the MUSE video signal with which Hi-Vision system signal processing was performed, The NTSC system digital disposal circuit 58 for performing NTSC system signal processing to the video signal with which time-axis conversion in an NTSC system was performed, The D/A (digital analog) converter 60 for changing into an analog signal the digital signal which the NTSC system digital disposal circuit 58 outputs, The NTSC system signal changed into the analog signal by D/A converter 60 is encoded, and the NTSC encoder / false rumor TORIKUSU circuit 62 for outputting as an NTSC signal, and the NTSC signal output terminal 82 connected to the output of a circuit 62 are included. The distinction signal outputted by the Hi-Vision system digital disposal circuit 54 is outputted from a terminal 83.

[0024] The Hi-Vision system digital disposal circuit 54 detects it, when the inputted video signal is a MUSE signal, and includes the synchronous detector 64 for outputting a distinction signal, and the deemphasis network 66 for performing de-emphasis processing to the MUSE signal inputted while it detects a synchronizing

signal from the digital signal inputted.
[0025] The time-axis transform-processing circuit 56 answers the memory 70 for storing the digitized MUSE signal which a deemphasis network 66 outputs, and the clock signal which the synchronous detector 64 outputs, and contains the memory controller 68 for making the video signal from which the time-axis was changed output from memory 70 by performing a store and read-out of a signal in memory 70 at the rate of predetermined, respectively.
[0026] The NTSC system digital disposal circuit 58 includes the signal separation circuit 72 for dividing into a luminance signal and a chrominance signal the signal outputted from memory 70, the circuit 76 which performs expanding processing of the time-axis of a chrominance signal, and the perpendicular filter interpolation circuits 74 and 78 for performing signal processing, in order to double with the specification of an NTSC system to a luminance signal and a chrominance signal, respectively.
[0027] What was already LSI-ized is put in practical use about the above-mentioned Hi-Vision system digital disposal circuit 54, the time-axis transform-processing circuit 56, and the NTSC system digital disposal circuit 58. However, about the Hi-Vision system digital disposal circuit 54, since it is necessary to output a distinction signal, the following modification is needed.
[0028] With reference to drawing 3 , the synchronous detector 54 used in the video-signal magnetic recording and the regenerative apparatus concerning this invention The PLL (Phase Locked Loop) circuit 84 for outputting the clock signal which answers a MUSE signal and is supplied to a memory controller, The band-pass filter (BPF) 86 which passes only a desired clock frequency among the clock signals which the PLL circuit 84 outputs, and the clock signal which BPF86 outputs are changed into a direct current signal, and the direct-current conversion circuit 88 for outputting as a distinction signal is included.
[0029] The frame pulse detector 90 for the PLL circuit 84 to detect the frame pulse which exists in the head of one frame of a MUSE signal, HD generating counter 92 for generating an internal Horizontal Synchronizing signal (HD) on the basis of the detected frame pulse, The HD phase comparator 94 for detecting a phase error with HD point inputted as the interior HD which HD generating counter 92 outputs, The loop filter 96 and D/A converter 98 for generating the clock signal which controlled VCXO100 and followed the input MUSE signal based on the phase error signal which the HD phase comparator 94 outputs, Dividing of the clock signal which VCXO100 outputs is carried out by the predetermined division ratio, it gives HD generating counter 92, and the counting-down circuit 102 for operating HD generating counter 92 is included.
[0030] With reference to drawing 4 , the distinction signal encoder decoder 26, and the record and the regenerative circuit 28 which are shown in drawing 1 have the following configurations. The distinction signal encoder decoder of this example records and takes out a distinction signal by frequency multiplex to a video signal or

FM sound signal. With reference to drawing 4 , the distinction signal encoder decoder 26 contains the encoder 104 for superimposing a distinction signal on the video signal recorded by frequency multiplex, and the decoder 106 for taking out a distinction signal from the video signal reproduced.
[0031] An encoder 104 answers the digital distinction signal inputted, and only when a distinction signal is a predetermined value, it contains the oscillator 108 for generating the single sine wave of a predetermined frequency, and the multiplex machine 110 for carrying out multiplex [of the sine wave which an oscillator 108 generates] to a video signal. What does not affect a video signal is chosen as an oscillation frequency of an oscillator 108. For example, if the thing of a VHS method is considered as record and a regenerative circuit 28, it is supposed that what is necessary is just to choose what satisfies a lower formula as a pilot tone frequency fp.
[0032] fp=1/2 and n-fh, however n point out a positive integer, and fh points out ihorizontal synchronous frequency. Among these, since it is used with the subcarrier of a chrominance signal, n= 80 cannot be used. fp is set to 629kHz at this time. therefore, 600kHz or less which does not straddle a luminance-signal band as easiest value as a frequency of an oscillator 108 while avoiding 629kHz, for example, 550kHz, (n= 70) -- then, it is good.
[0033] A decoder 106 changes into a direct current signal the AC signal outputted from BPF112 and BPF112 for passing only the frequency component which is the above-mentioned 550kHz of the playback video signal which record and a regenerative circuit 28 output, and contains the direct current transducer 114 for outputting as a distinction signal.
[0034] The video-signal processing circuit 116 for record and a regenerative circuit 28 to perform video-signal processing at the time of record to the video signal given from the switch 38 shown in drawing 1 , While giving the video signal to which it was outputted from the video-signal processing circuit 116, and the encoder of the distinction signal was carried out with the multiplex vessel 110 to the head 124 of the rotary drum 122 The video-signal processing circuit 120 which performs signal processing for playback is included to the video signal outputted by the rotary transformer 118 and the rotary transformer 118 for connecting the video signal reproduced by turns and considering as one video signal from two heads 124.
[0035] The oscillation frequency of 550kHz of an oscillator 108 will be inserted in the clearance which is not used as a video signal as shown in drawing 5 .
[0036] A/D converter 128 for the perpendicular filter 30 to change into a digital signal the video signal of the analog given from a selector 44 with reference to drawing 6 , By performing predetermined signal processing to the digital video signal which A/D converter 128 outputs By performing predetermined signal processing to the full-screen image circuit 130 for outputting the NTSC signal of the format of the full screen display D shown in drawing 15 , and the digital video signal which A/D converter 128 outputs The side cut image circuit 132 for outputting the video signal

of the format of the side cut screen C of drawing 15 is included.
[0037] The full-screen image circuit 130 is thinned out to the video signal (525 number of scanning lines) which A/D converter 128 outputs. The scanning-line conversion filter 134 for changing the number of scanning lines into 350, without changing the frame of a screen by processing interpolation etc., Perpendicularly the scanning line changed into 350 by time amount compression to the scanning line of 350 of the usual NTSC signal with the field memory 136 of the FIFO mold for carrying out time amount compression In order to fill up the 175 scanning lines which the image of an NTSC video signal will run short of The selector 138 for inserting 175 blanking lines and D/A converter 140 for changing into an analog signal the digital video signal which a selector 138 outputs, and outputting to one side of an input of a switch 46 are included.
[0038] The side cut image circuit 132 stores only the part adopted as a side cut image among the digital video signals which A/D converter 128 outputs, changes into an analog signal the digital video signal which 1H (horizontal scanning line) Rhine memory 142 of a FIFO mold for performing time amount expanding by carrying out a sequential output by the time amount of 1 horizontal-scanning segment and the Rhine memory 142 output, and contains D/A converter 144 for giving the input terminal of another side of a switch 46.
[0039] With reference to drawing 7 , the scanning-line conversion filter 134 contains 1 H line memory 148 by which the input was connected to the output of A/D converter 128, and 1 H line memory 152 by which the input was connected to the output of the Rhine memory 148. Each Rhine memory 148 and 152 is [both] the Rhine memory of a FIFO mold, delays the signal inputted 1H and outputs it. The scanning-line conversion filter 134 contains the multipliers 146, 150, and 154 by which the input was connected to the output of A/D converter 128, the Rhine memory 148, and the Rhine memory 152 further, respectively, and the adder 156 for adding the output of multipliers 146, 150, and 154.
[0040] The multipliers K1, K2, and K3 of each multipliers 146, 150, and 154 are switched per Rhine as follows.
[0041] With reference to drawing 8 , m lines after conversion are obtained by multiplying by multipliers Kb, Ka, and Kb and adding n lines before conversion, n+1 line, and n+2 lines, respectively. Moreover, m+1 line after conversion is obtained by multiplying by it and adding a multiplier Kc to n+2 lines before conversion, and n+3 lines, respectively. The n+2nd line is obtained by carrying out the multiplication of Kb, Ka, and the Kb to n+3 before conversion, n+4, and n+5 lines, and adding them to them, respectively. If this is referred to with drawing 7 , in [both] acquiring the video signal of the m-th line, it will set K1 and K3 to Kb, and K2 will be set to Ka. Moreover, in [both] obtaining the m+1st line, it sets K1 and K2 to Kc, and K3 is set to 0. Moreover, in order to obtain the m+2nd line, it is made to be the same as that of the case where the m-th line is obtained. Thus, the 520 scanning lines will be changed

into 350 by switching each multipliers K1-K3.
[0042] Hereafter, with reference to drawing 1 - drawing 11 , and the above-mentioned table 1, actuation of the magnetic recording and the regenerative apparatus concerning one example of this invention is explained according to each mode.
[0043] (1) External MUSE signal
(a) At the time of record record, switches 32, 36, and 38 all choose the input from the 1st input terminal (a). Both the switches 40 and 42 switch to a record (Rec) side. A selector 34 switches to the 1st terminal (a), and both the selectors 44 and 48 switch to the 2nd terminal (b).
[0044] The external MUSE signal inputted from a terminal 12 is given to MUSE / NTSC signal processing circuit 22 by the switch 32. MUSE / NTSC signal processing circuit 22 changes the MUSE signal inputted into an NTSC signal, and gives it to a selector 34. In order to change an aspect ratio at this time, the image of the wide aspect expressed by the original video signal turns into a longwise image, as shown in drawing 9 . Drawing 9 (a) is the output image of the circuit 22 when carrying out method conversion of this at an NTSC signal, when the white field of a perfect circle is located with the original image in middle of the screen. In the synchronous detector 64 of MUSE / NTSC digital disposal circuit 22, since an input signal is a MUSE signal, the clock signal of predetermined frequency is outputted from the PLL circuit 84, and it is given to the memory controller 68 and BPF86. BPF86 passes the clock signal outputted at this time, and is given to a direct current transducer 88. A clock signal is changed into a direct current signal by the direct current transducer 88, and is given to the 1st input terminal (a) of switches 36 and 38 as a distinction signal by it. The value of the distinction signal at this time serves as H level. A selector 34 answers this distinction signal and switches to a circuit 22 side.
[0045] A distinction signal is given to the distinction signal encoder decoder 26 through a switch 36. Moreover, this distinction signal is also given to selectors 44 and 48 through a switch 40, and selectors 44 and 48 answer this distinction signal, and switch to the 2nd input terminal (b), respectively.
[0046] On the other hand, the video signal by which method conversion was carried out is given to an NTSC signal through a selector 34 and a switch 38 in record and a regenerative circuit 28. A video signal is also given to the perpendicular filter 30 through a switch 42 and a selector 44 again.
[0047] With reference to drawing 4 , the signal of H level is given to an oscillator 108 as a distinction signal. An oscillator 108 oscillates the 550kHz single sine wave mentioned above, and gives it to the multiplex machine 110.
[0048] The video-signal processing circuit 116 performs predetermined processing for record to the video signal inputted, and gives it to the multiplex machine 110. The multiplex machine 110 makes a distinction signal the sine wave given from an oscillator 108 to the video signal inputted, carries out multiplex, and gives it to the rotary transformer 118. The rotary transformer 118 gives the video signal given to the

head 124 of the rotary drum 122. A head 124 records a video signal by scanning the recording surface of a tape 126 by turns.
[0049] The video signal changed into the NTSC signal is recorded on a magnetic tape, after being superimposed on a distinction signal. In this case, the information included in the original image is substantially included in the video signal recorded altogether. Moreover, a useless field [as / in the conventional full screen display D (refer to drawing 15)] is not included. Therefore, the effectiveness of record can be raised, recording all required information.
[0050] as the video signal of a full screen display (refer to drawing 10) with which an image including 175 blank lines is expressed by the full-screen image circuit 130 where the video signal again given to the perpendicular filter 44 with reference to drawing 1 is shown in drawing 6 -- a switch 46 -- on the other hand, a terminal is given. Moreover, this video signal is given to the input terminal of another side of a switch 46 as a video signal showing the side cut screen which removed both the sides of the original screen as shown in drawing 11 , and carried out time amount expanding horizontally by the side cut image circuit 132. Also in which this video signal, the deformation given to the image of the external MUSE signal inputted from the first by the circuit 22 is removed. That is, what should be displayed as a perfect circle with the image by the original MUSE signal is expressed as any screen as a perfect circle.
[0051] It is a user's freedom any of a full screen display and a side cut screen are chosen. By switching a switch 46, a user can give and display either of a full screen display and a side cut image on a television receiver 50 through a selector 48.
[0052] (b) After recording a playback external MUSE signal on a magnetic tape, when reproducing this, actuation is performed as follows. As shown in Table 1, about switches 32, 36, and 38, the condition is arbitrary. Switches 40 and 42 are switched to (PB) by each a playback side. The condition of a selector 34 is also arbitrary.
[0053] With reference to drawing 4 , a head 124 is reproduced in shift, it is combined with one signal by the rotary transformer 118, and the video signal currently recorded on the tape 126 is given to the video-signal processing circuit 120 and a decoder 106 by it. The video-signal processing circuit 120 is given to PB side edge child of the switch 42 which performs processing for predetermined playback to the inputted video signal, and is shown in drawing 1 . Since the frequency of 550kHz which does not affect an image as a distinction signal as mentioned above is chosen at this time, even if it does not remove this distinction signal, there is no possibility of having a bad influence on a display image.
[0054] Out of the reproduced video signal, BPF112 of a decoder 106 passes only a frequency component with an oscillation frequency [of an oscillator 108] of 550kHz, and is given to a direct current transducer 114. A direct current transducer 114 changes into a direct current signal the alternating current component which passed BPF112, and outputs it as a distinction signal. When the video signal currently recorded on the tape 126 changes a MUSE signal into an NTSC signal, it is

superimposed on the 550kHz signal with the oscillator 108. Therefore, there will be a component which passes BPF112 in this case, and the distinction signal outputted from a direct current transducer 114 serves as H level.
[0055] Since the signal of H level is again outputted from the distinction signal encoder decoder 26 with reference to drawing 1 , both the selectors 44 and 48 are switched to Terminal b side. The perpendicular filter 30 removes deformation from the image which deformed as mentioned above when method conversion was carried out, and outputs by using it as the full screen display shown in drawing 10 , or the side cut screen shown in drawing 11 . A user chooses a full screen display or a side cut screen, and makes it give and display on a television receiver 50 through a selector 48 by operating a switch 46.
[0056] (2) When a terminal 14 (refer to drawing 1) is given from a satellite broadcasting service MUSE satellite broadcasting service antenna and a MUSE signal is outputted from a broadcasting satellite tuner 20, the following record processings are performed. Switches 32, 36, and 38 are switched to the 2nd terminal (b) by each. Thereby, a MUSE signal is given to MUSE / NTSC signal processing circuit 22. Like the case where an external MUSE signal is inputted, MUSE / NTSC signal processing circuit 22 carries out method conversion, and gives a MUSE signal to an NTSC signal at a selector 34. Moreover, it is the same as that of the case where an external MUSE signal is inputted that the distinction signal of H level is outputted from MUSE / NTSC signal processing circuit 22.
[0057] Since the signal of H level is outputted as a distinction signal, a selector 34 chooses the signal from MUSE / NTSC signal processing circuit 22, and a switch 38 minds it, and it is given to record and a regenerative circuit 28. Moreover, since the distinction signal of H level is given, the distinction signal encoder decoder 26 superimposes a distinction signal on the video signal recorded on a magnetic tape through record and a regenerative circuit 28. Thus, the MUSE signal from satellite broadcasting service is recorded on a magnetic tape. In this case, like the case where an external MUSE signal is recorded, instead of all information being saved substantially [the original screen], in order to change an aspect ratio in method transform processing performed in MUSE / NTSC signal processing circuit 22, the image itself becomes what deformed longwise and it is recorded.
[0058] Regeneration of the MUSE signal from satellite broadcasting service recorded on the magnetic tape is the same as that of the case of playback of the already explained external MUSE signal. Therefore, the detailed explanation about them is not repeated here.
[0059] (3) The NTSC signal of satellite broadcasting service
(a) When recording the signal of the NTSC system received from record satellite broadcasting service, switches 32, 36, and 38 are switched to the 3rd input terminal (c) by each. Since there is no input signal in MUSE / NTSC signal processing circuit 22, the distinction signal to output serves as L level. Therefore, a selector 34 is

switched to a terminal (b).
[0060] The NTSC signal outputted from a broadcasting satellite tuner 20 is given to record and a regenerative circuit 28 through a selector 34 and a switch 38. Record and a regenerative circuit 28 record this NTSC signal on a magnetic tape. In this case, since a distinction signal is not inputted into the distinction signal encoder decoder 26, the video signal recorded is not overlapped on the distinction signal of predetermined frequency by the distinction signal 26.
[0061] (b) Playback of the NTSC signal recorded on the playback magnetic tape is performed as follows. The condition of switches 32, 36, and 38 is arbitrary. The condition of a selector 34 is also arbitrary. Switches 40 and 42 are switched to a playback (PB) side by each. The aspect ratio selecting switch 46 is switched according to a user's selection to either a full screen display or a side cut screen.
[0062] Record and a regenerative circuit 28 reproduce a video signal from a magnetic tape, and gives it to a selector 44 through a switch 42. In this case, since it is not superimposed on the distinction signal in the video signal reproduced, the distinction signal outputted from the distinction signal encoder decoder 26 is L level. The distinction signal of this L level is given to selectors 44 and 48 through a switch 40. Selectors 44 and 48 answer this distinction signal, and switch to a terminal (a) side, respectively. Therefore, the reproduced video signal is directly given and displayed on a television receiver 50 through a switch 42, a selector 44, and a selector 48 (without minding the perpendicular filter 30). In this case, since the signal recorded is originally an NTSC signal, deformation is not added to that image. Therefore, the original right image can be acquired by making it give and display on a direct television receiver in this way.
[0063] (4) In the case of a terrestrial NTSC signal and an external NTSC signal (a) In record of the NTSC signal of a terrestrial antenna input, the record switches 32, 36, and 38 switch to the 3rd input terminal (c), respectively. Moreover, in the case of record of an external NTSC signal, it switches to the 4th input terminal (d). The distinction signal of L level is outputted from MUSE / NTSC signal processing circuit 22. In other points, it is the same as that of the case of record of the NTSC signal from satellite broadcasting service. Therefore, the detailed explanation about them is not repeated here.
[0064] (b) Actuation of the video-signal magnetic recording and the regenerative apparatus 10 at the time of playback playback is completely the same as that of the case where the tape which recorded the NTSC signal from satellite broadcasting service is played. Therefore, the explanation about them is also omitted.
[0065] As mentioned above, according to this video-signal record and regenerative apparatus, method conversion is carried out and a MUSE signal is recorded on an NTSC signal by the magnetic tape. Under the present circumstances, although an image receives deformation with conversion of an aspect ratio, all those information is substantially recorded on a magnetic tape. And since the perpendicular filter 30 is

used at the time of playback and it displays on it as a full screen display or a side cut display, a right image can be acquired. The situation where it is impossible like [in the case of recording a side cut screen] to reproduce some screens at the time of playback is avoidable. Moreover, since a full screen display is also possible when the perpendicular filter 30 switches, the high definition television signal by the MUSE signal can fully be enjoyed.

[0066] Moreover, since it is not necessary to record the part equivalent to a blank line compared with the case where the video signal of a full screen display is recorded on a magnetic tape like before, the effectiveness of record improves conventionally.

[0067] In the 1st example, as distinction signal encoder decoder, frequency multiplex [of the sine wave of predetermined frequency] was carried out into the video signal, and what takes this out using BPF was shown at the time of playback. However, this invention is not limited to this but can also use time-division multiplexing which inserts a distinction signal in a part of video signal. As for drawing 12 , an example of such distinction signal encoder decoder is shown.

[0068] With reference to drawing 12 , the distinction signal encoder decoder 158 using Time Division Multiplexing of the video-signal magnetic recording and the regenerative apparatus concerning this 2nd example is a part to the distinction signal with which the reproduced video signal was beforehand determined as the encoder 160 which consists of a selector 164. The decoder 162 for outputting is included. The record and the regenerative circuit 170 used for the video-signal magnetic recording and the regenerative apparatus concerning this 2nd example on the other hand The video-signal processing circuit 172 for performing signal processing for record and giving one side of the input terminal of a selector 164 to the video signal given, While the distinction signal outputted from a selector 160 gives the video signal by which Time Division Multiplexing was carried out by turns to the head 124 of the rotary drum 122 and makes it record on a magnetic tape 126 The rotary transformer 174 for a head 124 to connect and output the video signal reproduced by turns to one at the time of playback, The video-signal processing circuit 176 for giving the playback side input terminal of the switch 42 which performs signal processing for playback to the playback video signal outputted from the rotary transformer 174, and is shown in drawing 1 is included.

[0069] The video-signal processing circuit 172 counts the Horizontal Synchronizing signal within the perpendicular baseline period of the NTSC signal inputted, and only the 10H position period makes the input of a selector 164 a distinction signal. In other periods, a selector 164 chooses the video signal which the video-signal processing circuit 172 outputs, and gives it to the rotary transformer 174. In the present NTSC signal, Rhine which is not used for the period of 10-20H as an image exists. H level or L level of a distinction signal will be recorded on either of this 10 - 20H section (the case of this example theH [10th] section), and the so-called Time Division Multiplexing will be performed to it.

[0070] Similarly, in the 10thH section within the perpendicular baseline period in a regenerative signal, the video-signal processing circuit 176 also outputs the sampling control signal 180, and gives it to a decoder 162.
[0071] One side of an input is connected to the output of the video-signal processing circuit 176, and a decoder 162 includes the selector 166 to which the input is not given, and the hold circuit 168 for holding the output of a selector 166 till the 10H position period of the perpendicular baseline period of the next field in another side.
[0072] Decoding of the distinction signal at the time of playback is performed as follows. The video-signal processing circuit 176 outputs the sampling control signal 180 to the period of the 10th H of each field of a playback video signal as mentioned above. Although an input twists in a usual state and it is switched to the terminal of the direction, the selector 166 of a decoder 162 answers the sampling control signal 180, and only the period when the sampling control signal 180 exists chooses the output of the video-signal processing circuit 176, and it gives it to a hold circuit 168. A hold circuit 168 samples the output of a selector 166, holds it synchronizing with a control signal 180, is held to the 10H of the perpendicular baseline period of the next field, and is outputted as a distinction signal. therefore, the 10th of the perpendicular baseline period of the video signal with which the value of the signal outputted from a hold circuit 168 is reproduced -- when the distinction signal written in the Hth is H level, it is set to H level, and in the case of L level, it is set to L level. That is, a playback video signal can distinguish whether a MUSE signal carries out method conversion from the value of this distinction signal.
[0073] The wave within the perpendicular baseline period of the video signal with which the video signal recorded is recorded when not being that by which method conversion was carried out on NTSC system from MUSE is shown in drawing 13 (a). As shown in drawing 13 (a), the 10thH a position of period is L level in this case. If this signal is reproduced, it turns out easily that L level is taken out as a distinction signal.
[0074] The wave form chart within a perpendicular baseline period in the case of being the MUSE signal from which the signal recorded was changed into NTSC system is shown in drawing 13 (b). As shown in drawing 13 (b), the distinction signal of H level is written in the 10thH a position of period within a perpendicular baseline period in this case. Therefore, the distinction signal of H level is taken out by reproducing this and holding the value of the 10thH a position of period within a perpendicular baseline period.
[0075] Also with the video-signal magnetic recording and the regenerative apparatus applied to this 2nd example as mentioned above, after changing a MUSE signal into an NTSC signal like the magnetic recording and the regenerative apparatus of the 1st example, it can record efficiently and the image from which deformation was moreover removed can be enjoyed. Moreover, all the information that the original MUSE signal held is saved substantially at the magnetic tape. Therefore, if required, all screens can

be checked and enjoyed by performing a full screen display etc.
[0076]
[Effect of the Invention] According to this invention, all the information on a subject-copy image can be substantially saved as mentioned above by allowing, changing and recording deformation of an image on the signal of the 2nd television system with which aspect ratios differ the signal of the 1st television system. Moreover, since deformation of an image is removed at the time of playback, a right image can be displayed. Since a blank line etc. is not included in a record image, the recording efficiency of a record medium can be raised conventionally.
[0077] It is superimposed on the distinction signal which expresses the class of signal with the video signal recorded after it is distinguished by the 2nd television system according to invention according to claim 2 whether it is the signal of the 1st television system by which method conversion was carried out, and whether it is the signal of the 2nd television system originally. In the case of the video signal of the 1st television system by which method conversion was carried out including deformation, by taking out this distinction signal at the time of playback, the right image with which it was directly reproduced when the image from which deformation was removed by the image restoration means was other can be displayed.
[0078] Consequently, while all of the video signal of the 1st and 2nd television systems can be recorded at high effectiveness and can record the information on a subject-copy image altogether substantially, even if it is the case where it was refreshable in the right form and the image of the video signal of the 1st television system is moreover transformed with conversion of an aspect ratio, at the time of playback, this can be distinguished and it can display correctly.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the block diagram of the video-signal record and the regenerative apparatus of the 1st example of this invention.
[Drawing 2] It is the circuit block diagram of MUSE / NTSC signal processing circuit.
[Drawing 3] It is the circuit block diagram of a synchronous detector.
[Drawing 4] It is the circuit block diagram of distinction signal encoder decoder, and a record and a regenerative circuit.
[Drawing 5] It is the frequency allocation Fig. showing the selectable field of a distinction signal.
[Drawing 6] It is the typical block diagram of a perpendicular filter.
[Drawing 7] It is the typical block diagram of a scanning-line conversion filter.

[Drawing 8] It is drawing showing scan transform processing typically.
[Drawing 9] It is the mimetic diagram of an image which the video signal changed into the NTSC signal from the MUSE signal expresses.
[Drawing 10] It is the mimetic diagram of a full screen display.
[Drawing 11] It is the mimetic diagram of a side cut screen.
[Drawing 12] It is the block diagram of the distinction signal encoder decoder used for video-signal record and the regenerative apparatus of the 2nd example of this invention, and a record and a regenerative circuit.
[Drawing 13] It is a wave form chart showing the distinction signal by which Time Division Multiplexing was carried out in the 2nd example of this invention.
[Drawing 14] It is the typical block diagram of the conventional video-signal record and regenerative apparatus.
[Drawing 15] It is the mimetic diagram showing the format of the screen by conversion of a television system.
[Description of Notations]
10 Video-Signal Magnetic Recording and Regenerative Apparatus
20 Broadcasting Satellite Tuner
22 MUSE / NTSC Signal Processing Circuit
24 TV Tuner
26 Distinction Signal Encoder Decoder
28 Record and Regenerative Circuit
30 Perpendicular Filter
46 Aspect Ratio Selecting Switch
64 Synchronous Detector
158 Distinction Signal Encoder Decoder
170 Record and Regenerative Circuit